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GENERAL ATROPHY OF THE CONDUCTING APPARATUS OF THE EAR

(*Proliferous Inflammation.*)

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IN *The American Journal of Otology* (vol. iv., p. 266) may be found a paper, by Blake, of Boston, on *The Progressive Growth of the Dermoid Coat of the Membrana Tympani*, in which the progress of paper discs from the membrane of the drum outward is described.

I have not repeated the experiment, but many of us have watched a blackened eschar from nitrate of silver follow the same course. The chief importance attachable to this action of the epidermis is that it offers us a rational explanation of the impaction of cerumen in the external meatus.

It seems like going far afield to attribute the collection of wax to hypersecretion or mechanical impaction, when it so often occurs without these causes being ostensible, and, on the other hand, when these so often exist without being followed by this condition. Children are most exposed to mechanical impaction in the anxiety of mothers, or the mistaken diligence of nurses in their efforts to "keep the ears clean," yet it more rarely occurs at this age than at any other, thus proving that these act only as occasional and remote causes. Why should wax collect a second time in the case of an adult, who has been advised that he was probably instrumental in its production by his attempts to wipe out his ears with a towel during his bath?

Do we often find other evidence of hypersecretion than the amount to be removed?

In children there is greater functional activity than in adults, and yet impaction of wax occurs most frequently after twenty-five years of age, and I am disposed to look for its cause in *impaired nutrition of the tissues of the external meatus, which, by retarding the progress outward of the epidermis, only delays the removal of the cerumen in a natural way.*

Of course, if this explanation be accepted, it will lead us into a consideration of the disease of the ear with which the collection of wax is associated, and upon which it, in a great measure, depends. In time this view may be taken and collection of cerumen looked upon as merely an early symptom of a process which produces great deprivation and distress; a symptom which may put us on our guard and enable us to protect our patients, and remove a reproach to the workers in our special field by inducing us to undertake their treatment in the early stages of a disease, for which we wait now, until it has so much altered the tissues making up this organ that the ear cannot perform its function.

The affection is variously called "The atrophic class of chronic aural catarrh"¹; "The so-called sclerotizing form of inflammation"²; "Proliferous inflammation of the middle ear,"³ etc.

Writers on this subject do not seem content with the term *inflammation*, and evidently call it such for want of a better name, or a clearer understanding of the process. In many instances the ordinary symptoms of inflammation are entirely absent, and we are able to get no history of their ever having existed, though sometimes we learn that the individual noticed such symptoms a long time before, perhaps in childhood, but in recent years nothing had occurred to fix his attention upon this organ or its appendages.

In case of such antecedent history, there is characteristic evidence of the inflammatory process, involving the nares, post-nasal pharynx, Eustachian tube, and middle-ear cavity, in hypertrophy of the lining membrane, increased secretion,

¹ Burnett: "Trans. of the Am. Otological Society," 1885, p. 414.

² Politzer: "Diseases of the Ear," Am. ed., p. 79.

³ Rossa: "Treatise on Diseases of the Ear," 4th ed., p. 282.

and temporarily impaired hearing, associated frequently with tinnitus: and, at a later period, with adhesions of the ossicula auditus and the tensor muscle, with retraction of the membrana tympani. These individuals can tell of frequent variations in all the subjective evidences of the affection, depending greatly upon the barometric condition of the atmosphere. When we can distinguish these cases as a class, we have *at once* an indication as to the probability of improvement by treatment, for these can be classed clearly as *catarrhal*, and are as amenable to treatment, though not so prompt in response, as catarrhal conjunctivitis. In this they differ from the other class which we are attempting to discuss, which have no antecedent history of inflammatory action so far as we can learn, but are characterized clinically by the familiar combination of symptoms of impaired hearing, constantly, but slowly, gradually and insidiously progressive, without inflammatory pain, ostensible swelling, or increased secretion at any time.

My observation teaches me that one of the very earliest evidences of this disease, and one so little liable to attract notice that the patient's attention must often be directed to it, is a *seething* tinnitus. This will increase and become more decided as the disease progresses, until it forces recognition, and then only will there be complaint. This is as insidious as the deafness. The Eustachian tube is not only pervious, but often unusually large and dry, with nothing to indicate that it has ever been seriously obstructed. The middle-ear cavity is abnormally dry and free from secretion. The membrane of the drum is blanched, opaque, apparently smaller in size, retracted, motionless during inflation, and often striated. The external meatus is dry and often irritable, with a history of one or more removals of wax.

There may be exfoliation of epidermis, and sensitiveness of exposed nerve filaments in the early stages. Later, the meatus becomes enlarged from the close adhesion of the skin in the osseous portion, and the probable decrease of connective tissue and atrophy of the ceruminous glands. Some or all of these changes are present.

To me this presents more the phase of a local atrophy

than of an inflammation, and I think its subsequent history and the measures which contribute most to its relief will bear out this view. The more serious affection may be masked by a catarrhal trouble present, and may not be apparent until this is relieved. Here often exists the cause of the seeming confusion in diagnosis and the difficulty of prognosis.

Burnett¹ of Philadelphia describes an "atrophic class of chronic aural catarrh," in which "the nares are atrophic, their capacity is increased, the mucous membrane over the turbinated bones and septum is pale, dry, and shining, or varnished in appearance."

Atrophy of the ear may exist without, though usually with, this condition of the nares: the undue and excessive patulence of the Eustachian tube is always present, according to my observation.

It may be a secondary degenerative process after, and the consequence of, an hypertrophy of the same tissues, in which they assume a lower form than is absolutely requisite to the functions of the organ, associated with other and accidental conditions—*accidental* in the sense of not occurring in every case.

Many writers look upon the impaction of wax with suspicion as an evidence of deeper-seated trouble, chiefly because often after its removal, impairment of hearing persists; though by others this is considered merely a complication or a co-existence of two diseases, instead of an extension of the same morbid change, expressing itself by its interference with the function of the parts attacked.

As the affection progresses, there is a change from the collection of cerumen to a complete cessation of its secretion. "In certain cases of well-marked deafness it is a common experience to hear patients say they never find wax in the ears, and have not for months or years past."²

Buck and Pomeroy³ seem to think this due rather to reflex action of the pharyngeal upon the ceruminous glands, than to a direct extension of the affection through the

¹ "Trans. of the American Otological Society," 1885, p. 414.

² Buck: "Diagnosis and Treatment of Diseases of the Ear," p. 59.

³ "Trans. of the American Otological Society," 1872.

middle-ear cavity to the meatus, which to my mind seems the natural and actual course. "The mucous membranes, in accordance with their course, have a great tendency to communicate their affections."¹ "Atrophy of the drum membrane, partial or total, is very common. * * * There are cavities lying above the meatus which are part of the middle ear and lined with mucous membrane."²

Nearly all observers believe that the tissues of the middle-ear cavity share in the changes found in the pharyngeal cavity, and the conditions of the drum membrane certainly favor this view. What is to prevent an extension by continuity? The blood-vessels of the cavity of the middle ear, the membrane of the drum, and the meatus are continuous to a great extent, as are those of the Eustachian tube and the middle-ear cavity, transmitted from the ascending pharyngeal and inferior palatine arteries. The efferent fibres of the trigeminus supply vaso-motor influence to some of the blood-vessels of the face, the external meatus, and the upper and anterior part of the middle-ear cavity. Beside the continuity and similarity of tissue, what better common vascular and nerve supply can be conceived? Sharing the same nutrition, should not the nutritive changes be the same in each?

Schwartze says that purulent inflammation of the meatus "without perforation of the drumhead, which is met with in adults, is usually only an accompanying symptom, or a precursor of acute inflammation of the drum cavity." If I understand this, it means that the cause exists originally in the meatus, or that some influence acts upon both the meatus and the cavity, the meatus first responding, as most easily affected. Have we not here, in an acute inflammation, an analogue to the probable course of events in a severely chronic process? To quote Woakes: "Most chronic diseases of this (post-nasal) region tend to impair the functional activity of the nerves distributed to it, * * * which may induce its own set of changes in the auditory apparatus after the causes exciting it have disappeared."

¹ Johannes Müller: "Handbuch der Physiologie," vol. i., p. 651.

² Schwartze: "Pathological Anatomy of the Ear," Am, ed,

This affection does not often occur in persons under thirty, and each decade after this age appears to have a progressively greater number of sufferers. This is probably due to diminished physical vigor of the general system which has a decided predisposing influence in its production. There is reason to believe that general mal-assimilation and the condition of exhaustion incident to parturition are active factors. We know that perforations of the membra tympani rarely heal in persons afflicted with phthisis.

Wilde has seen speckled opacity of the drumhead in women deaf after parturition. Calcareous deposits are observed in the drum membrane which do not more need an inflammation for their production, than does ossification of the arteries. Ossification, according to Schwartze, may occur within calcified membranes. It is a gradual retrogression in tissue character.

Local atrophy of the skin is sometimes seen in old people in the regions limited by the distribution of a nerve, especially some branch of the trigeminus. This kind of change takes place with advancing age in most people, though some show the senile changes earlier than others.

It is somewhat curious that this disease is comparatively rare among young people; as rare as the arcus senilis. I have never seen it in a child whose circulation has power to overcome the difficulties to which that of older people succumbs.

Treatment.—Politzer¹ thinks “a classification on a clinical basis seems best at present.”

In this consideration the methods and results of treatment claim space.

As to its incurability and hopelessness the opinion is almost consentaneous. We know, however, how it must end unless some effort is made, and yet, it is not an attractive field in which to work.

Any surgeon will feel it his duty to do what he can, even with a very slim chance, to retard an optic atrophy, which means only blindness; whereas, in a disease which must ultimately, if left to pursue its course, result in profound

¹ “Diseases of the Ear,” Am. ed., p. 241.

deafness ; and worse, in distracting tinnitus, a wretched feeling of compression in the head, and a depression of spirits suicidal in the impulses it engenders, he feels that he has done his duty, if, without any effort, he dismisses his patient with the prognosis, *incurable* ; thereby, in proportion to his eminence in his work, condemning the sufferer to despair more or less complete.

My experience has taught me that these cases are not, as a class, so hopeless as those of optic atrophy. In those more advanced in age they are comparatively so, but in younger people of good nutrition in other respects, there is a chance by careful, persistent, and judicious management, to make many of them better, or, at least, to delay the evil.

Time and patient effort cannot be dwelt upon too much, for without these nothing will avail. We are dealing with a process which has generally been existent for years, and three, six, or twelve months will often give no indication of the ultimate result. We must persist, encourage the patient though it require much labor on our part and expense on that of the patient, and the end will frequently repay him. Our great difficulty will be found in the willingness of the patient to persist. If, however, the facts are made clear to him in the beginning, and he is assured that a spasmodic effort will bring nothing but expense and lost time ; that, if he commences, he must first resolve to continue for at least three years, the way is made easier.

My first experiment was made with a patient in the hospital, a protégé of Sweet Charity.

The conditions were as heretofore described. For two and a half years no change was perceptible in the function of hearing, although the middle ear became less dry, the membrane gradually resumed a better position and improved in vitality, and the dermis of the meatus became more pliable, and the ceruminous glands again secreted wax. During the next six months there was a change from profound deafness to a condition in which the hearing seemed only slightly impaired for practical purposes, and I lost sight of him.

A delicate test he did not hear at first. We were satisfied,

if by any effort of voice, we made him understand what was said. At the last, he could hear readily conversation addressed to him at a distance of some feet (six or eight).

Another, whom I saw first in 1879, had been a general of volunteers during the civil war, and attributed the deafness in the left ear to the concussion caused by cannon in 1863, though it had continued to grow steadily worse. Hearing with the right ear became impaired, he thought, through sympathy. He never had pain, but there was a constant singing in both ears, which very occasionally varied to the sound of ringing bells. His health had always been good, except that he "once had inflammation of the brain." Such was the history given. He could not hear my watch in contact with either ear until after inflation, when it was heard in contact with the left ear, and with the right ear as close as I could hold it, without contact. *Ett* were free: *Mtt* opaque, without lustre, and diminished in diameter; the meati were desquamating, with no account of accumulation of cerumen: air forced into the middle ears sounded as if passing through a quill.

According to his statement, he had been advised by one of my confrères, that it was better to let them alone, as the condition was not curable. I could not give him a very favorable prognosis, but told him if he began it he might be compelled to continue under treatment for three or four years or be disappointed. As he was unfitted for his occupation, he decided that he would take the chances. For eighteen months there was no change in the tinnitus or the hearing, although the *Mtt* regained their lustre, and the ceruminous glands resumed their function; the pharynx lost its pallor, and the lining membrane of the middle ear became moist, as the sounds during inflation proved. In my examination I could not attract his attention by shouting across a room sixteen feet wide; at the end of two years he could carry on a confidential conversation, and hear the debates in Congress from the reporters' gallery, which is very difficult. When his hearing was sufficient for practical purposes, he discontinued, and I have had no opportunity to test his hearing since, but having met him a

few weeks ago (Dec., 1885) on the street, he told me that he continued to improve, and more during the past than any previous year; that he was conscious of hearing new sounds from time to time. He has no tinnitus.

These are two of a number of experiences, and seem to me enough to encourage further trial in these cases. I know that the weight of opinion is against this view, and, for that reason, was not hopeful at first, but my impression of the affection is based upon my personal experience, and the kind of treatment that has given the best results in my hands, and, because of this, I do not feel justified in condemning these people to separation from their fellows without a fair and intelligent attempt to save them.

It seems to me a misfortune that we do not undertake these cases in the earlier stages, when is first noticed a derangement of the secretion of cerumen, long before the tissues of the conducting apparatus of the ear are so much altered as to impair the proper performance of its function. Deafness and tinnitus are only, as we know, the symptoms that something is awry and the more speedily this is corrected the more easily it is done.

Generally, however, the ears have been syringed, and impacted cerumen removed one or more times, before a special surgeon is consulted. The view ordinarily taken, that impaired hearing due to plugging of the meatus depends upon that alone, and that the removal of this plug is *all* that is necessary, has its evil influence. When that is done, *the disease which causes it is left to pursue its course unmolested.* Often, after the wax has ceased to collect, the individual, or his family physician for him, syringes the ear, under the impression that impaired hearing is again due to the same cause as at first, and forcing a stream of water upon the exposed drumhead cannot be beneficial.

Would it not be better *not* to wait for impairment of hearing, but to try to relieve the disease which must ultimately produce it? We would not, I think, find so many cases of doubtful prognosis if we pursued this course. It is poor observation which does not find this affection often where the hearing is normal; the organ is only not so much

changed as to prevent hearing. Is it wise to dismiss a case as cured in which impaction of wax has existed only with its removal?

I ask only that these cases shall be watched carefully with these suggestions in view.

Tinnitus can often be relieved by a restoration of the nares, particularly the posterior nares, to a condition approaching the normal; but I do not think this exercises any except a remote influence upon the hearing. The impaired circulation, which is at the foundation of this affection, should be quickened, and the result, depending upon the power of recuperation in the individual, will vary greatly. Improving nutrition in this way is all we can do.

As to the methods of improving nutrition:

While we all, or nearly all, agree that the galvanic current has no demonstrable influence upon the nerves of special sense beyond that of excitation, is it so clear that it does not improve the nutrition of the tissues of the middle and external ear through the sympathetic system?

My chief reliance in these cases has been vapor of iodine, and I judge of its effect by the appearance of hyperæmia of the drum-membrane, and particularly of the vessels along the manubrium of the malleus. In cases of long standing it is not possible to get this effect at once, but by an interview every day for several weeks it is accomplished, and then it is needful to see the patient only often enough to foster a moderate amount of action. This will vary with the individual and the length of time the disease has already existed. In some old cases it can not be done at all, and these are hopeless.

After a time the sensations of the patient will aid us, but at first these are unreliable as a guide to the effect produced: the feeling is one of glow or moderate warmth, and, in most instances, the drumhead will then show the effect. In hardened cases, months may pass before there is any feeling or other evidence of hyperæmia, and experience and close observation must be our guides.

It is well to take the same precautions against an acci-

dental increase of the effect that would be taken in subacute catarrhal inflammation, as it is desirable to maintain control of it. I have had one accident in seven years. The patient left my office after being treated one spring day, when it was too warm in the house with the windows down and too cold with them open. He went to the court-house, sat in a crowded room with his back to an open window for an hour, and that night had an acute inflammation of both ears, following a chill, which might have happened under such circumstances if he had not been treated. The ears suppurated, but he recovered entirely with good hearing; as much improvement as I *might* have made in a month, or six months, in the way described. This was five years ago, and his hearing is as good to-day.

Every operation is attended with *some* risk.

This method requires, of course, the Eustachian catheter, in order to make the application as directly as possible to the affected regions, and even with this condition progress is slow, but there is generally *progress*.

In affections of the ear, acute or subacute in character, in which tinnitus and deafness depend upon closure of the Eustachian tube by congestion of the lining membrane, and in which both ears are affected in a like degree, the Politzer method of inflation is often serviceable. To apply simply the air-douche to the ears indirectly in this state of progressive atrophy does not promise much. It requires medication of very direct character, and not that air shall be compressed in the pharyngeal space, to find its way by mechanical force in the direction of least resistance, which means into the *better* ear, if there is a difference. This does not seem to be in accord with the careful and rational course usually pursued by us.

With the catheter the application is made directly towards the diseased region, and my observation leads me to the conclusion that the objections made to the use of the instrument are captious, except in occasional acute or subacute inflammation. The chief advantage of the Politzer method is that it requires no special skill, but may be ap-

plied with facility, especially in the case of children, and even them it alarms.

Its disadvantage is that it is remote in its effect, which is increased by the facts that the ear least affected is usually most treated, and that it is given into the hands of laymen, who treat their symptoms and not the disease underlying them.

The objections ordinarily made to the use of the catheter are that, by contact, it increases local congestion, is painful, and has no advantage over other methods.

The use through the catheter to the Eustachian orifice and the vault of the pharynx of such an astringent (sol. argent. nit., 1-500 parts) as might be applied to an eye affected with a slight catarrhal conjunctivitis, will not only abort the deleterious effect of the instrumentation, but will greatly benefit the hyperæmia which makes advisable the introduction of the instrument. In fact, I know no means so cleanly, so agreeable, and so effective of treating the posterior nares and the vault of the pharynx, and I think I have tried them all, except the use of ointments as suggested by Seely,¹ of Cincinnati. That its introduction is disagreeable no one can deny; all agree that it can, by unskilful management, be made very painful, but even with greatly distorted nares, if handled with some knowledge of the anatomy of the region, and some degree of *tactus eruditus*, it need be only disagreeable, as children after their first alarm usually submit gracefully, which they never do to pain. They manifest more rebellion against the Politzer method than against the use of the catheter after it has once been skilfully used. The danger of mechanical injury from instruments introduced behind the velum (the probang, or ordinary spray apparatus) is greater than from the catheter properly used.

Conclusions.—That, proliferous non-suppurative inflammation of the middle ear is, in the nature of the structural changes, a general atrophy of the tissues making up the ear.

That, impaction of cerumen, and an almost inaudible *seething* tinnitus are separately, or together, among the earliest symptoms of the disease.

¹ "Trans. of the American Otological Society," 1885.

That, a collection of cerumen is not due to increased action of the glands, necessarily, but to *retarded motion outward of the epidermis of the external meatus* resulting from progressive atrophy, which, in time, affecting the glands diminishes their secretion.

That, it is advisable *not* to wait for deafness before beginning treatment of the structural impairment upon which it depends.

That, with care at a proper period, these cases are curable as a class.





